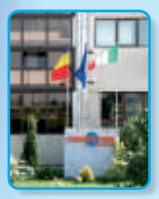
# CROMSTEEL INDUSTRIES

chromed bars

cylinder tubes

CROMSTEEL INDUSTRIES

www.cromsteel.ro







CROMSTEEL INDUSTRIES

**Total surface:** 100 000 $m^2$
**Production area:** 30 000 $m^2$
**Turnover in 2008:** 45 000 000 Euro
**Production capacity:** 2500 tons of steel monthly

*From the foundation in year 2000 the mission of CROMSTEEL INDUSTRIES has been to produce precision shafts and bars for linear motion and hydraulic systems.*

*The main goal set by CROMSTEEL INDUSTRIES is to ensure the highest grade of product performance and innovation to meet any customer need and expectation. For us long term success is the interaction of rigorous quality management and a broad range of products made possible by the vertical integration of our manufacturing processes. These two factors combine into tangible superior value for linear motion and hydraulic system OEMs and distributors.*

*Our past and future success is built upon two strengths: vision on technology and the core values we live every day (the spirit, the philosophy and the transactional policies).*

### *Customers*

*We believe that trust, respect, mutual understanding and prompt support to customers are key to long term partnership.*

### *Innovation*

*Competitive companies have to innovate. CROMSTEEL INDUSTRIES invests resources in research, development and planning, and all this together with a constant effort to anticipate the needs of our customers by striving to improve quality and reduce costs result in delivering outstanding products.*

### *Staff*

*We believe that every employee should ascent together with the company.*

### *Integrity*

*The management and the staff of CROMSTEEL INDUSTRIES always act with integrity and they are guided by honesty and ethics in relation with customers. We are strong and honest competitors.*

### *Corporate Social Responsibility*

*CROMSTEEL INDUSTRIES and its employees are aware of their responsibility towards the community and its well-being, especially in the area of atmosphere conservation. It is our duty to keep the air clean and healthy, since it has a direct and remarkable influence on the life of people.*

*We invite you to be one of our valuable customers among the others from more than 55 countries we are serving all over the world.*

***Paolo MENNINI***

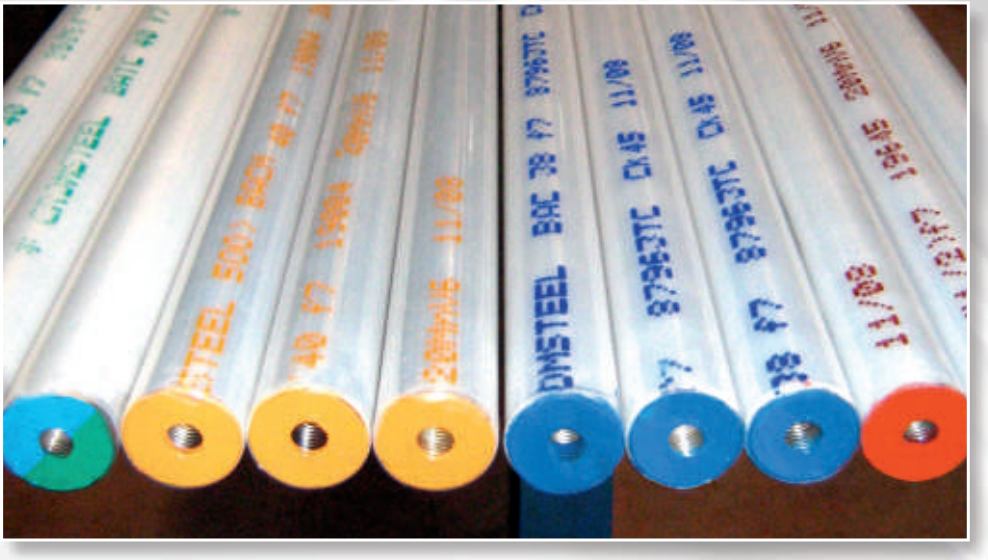
*GM & COB*

# PISTON RODS

Hard chrome plated steel bars

Hard chrome plated steel tubes

Hydraulic pistons rods and components



| EN 10267 | Werkstoff No. | DIN | STAS 500 | AFNOR A36101 A35501 | B.S. 1449 4360 | UNI 7070 | JIS G3106 | GOST 380 19281 | AISI SAE ASTM |
|---|---|---|---|---|---|---|---|---|---|
| 19MnVS6 | 1.5217 | 20MnV6 | - | - | - | - | - | - | - |
| EN 10083 | Werkstoff No. | DIN 17200 | STAS 880 | AFNOR NFA33101 35551 | B.S. 970 1449 | UNI 7845 8373 | JIS G4051 | GOST 1050 | AISI SAE ASTM |
| C35E | 1.1181 | Ck35 | OLC35X | 2C35, XC32 XC38H1 | 080A35 | C35 | SC35 | 35 | 1035 1038 |
| C45E | 1.1191 | Ck45 | OLC45X | 2C45,XC42H1 XC45,XC48H1 | 080M46 060A47 | C43 C46 | S45C S48C | 45 | 1045 |
| EN 10083 | Werkstoff No. | DIN 17200 | STAS 791 11500 | AFNOR NFA35552 NFA35551 | B.S. 970 | UNI 7845 7847 7846 | JIS G4051 G4052 G4104 | GOST 4543 | AISI SAE ASTM |
| 42CrMo4 | 1.7225 | 42CrMo4 | 42MoCr11 | 42CD4 42CrMo4 | 708A42 708M40 709M40 | 42CrMo4 | SCM440(H) | - | 4140 4142 |
| EN 10088 | Werkstoff No. | DIN 17440 | STAS 3583 | AFNOR 35573 | B.S. 970 3100 | UNI 6901 | JIS G4303 | GOST 5632 977 | AISI SAE |
| X20Cr13 | 1.4021 | X20Cr13 | 20Cr130 | Z20Cr13 X20Cr13 | 420S37 | X20Cr13 | SUS420F | 20H13 | 420 |
| X46Cr13 | 1.4034 | X46Cr13 | 40Cr130 | Z44C14 Z38C13M | 420S45 | X40Cr14 | SUS420J2 | 40C413 | 420C |
| X17CrNi16-2 | 1.4057 | X17CrNi16-2 | 22NiCr170 | Z15CN16-02 X17CrNi16-2 | 431S29 | X16CrNi16 | SUS431 | 20H17N2 | 431 |
| X90CrMoV18 | 1.4112 | X90CrMoV18 | - | - | - | - | - | - | - |

## CHEMICAL COMPOSITION

### CHEMICAL COMPOSITION, % BY WEIGHT

| STEEL GRADE | C | Si max | Mn | P max | S max | Cr | Mo | Ni | V |
|---|---|---|---|---|---|---|---|---|---|
| 20MnV6 | 0.16-0.22 | 0.55 | 1.30-1.70 | 0.035 | 0.035 | - | - | - | 0.10-0.20 |
| Ck35 | 0.32-0.39 | 0.40 | 0.50-0.80 | 0.035 | 0.030 | max 0.4 | max 0.1 | max 0.4 | - |
| Ck45 | 0.42-0.50 | 0.40 | 0.50-0.80 | 0.035 | 0.035 | max 0.4 | max 0.1 | max 0.4 | - |
| 42CrMo4 | 0.38-0.45 | 0.40 | 0.60-0.90 | 0.035 | 0.035 | 0.90-12.0 | 0.15-0.30 | - | - |
| X20Cr13 | 0.16-0.26 | 1.00 | max 1.50 | 0.040 | 0.030 | 12.0-14.0 | - | - | - |
| X46Cr13 | 0.43-0.50 | 1.00 | max 1.00 | 0.040 | 0.030 | 12.5-14.4 | - | - | - |
| X17CrNi16-2 | 0.16-0.25 | 1.00 | max 1.50 | 0.040 | 0.030 | 15.0-17.0 | - | 1.5-2.5 | - |
| X90CrMoV18 | 0.85-0.95 | 1.00 | max 1.00 | 0.040 | 0.030 | 17.0-19.0 | 0.9-1.3 | - | 0.07-0.12 |

## MECHANICAL PROPERTIES

| STEEL GRADE | Rm Tensile strength - N/mm2 - | $Rp_{0.2}$ Yield point - N/mm2 - | A5 Elongation - % min - | KV Impact test - J - | HB Max. hardness - A - |
|---|---|---|---|---|---|
| 20MnV6 (natural state) | 600-750 | min 390 | 17 | min 27 at -20°C | 207 |
| Ck35 (natural state) | 600-750 | min 410 | 18 | - | 190 |
| Ck45 (natural state) | 650-830 | min 440 | 15 | - | 207 |
| 42CrMo4 (in Q+T condition) | 900-1200 | min 650 | 11 | min 35 | 241 |
| X20Cr13 (annealed) | max 760 | - | - | - | 230 |
| X46Cr13 (annealed) | max 800 | - | - | - | 245 |
| X17CrNi16-2 (annealed) | max 950 | - | - | - | 295 |
| X90CrMoV18 (annealed) | - | - | - | - | 265 |

## CHEMICAL COMPOSITION, % BY WEIGHT

| STEEL GRADE AISI/SAE | C | Si max | Mn | P max | S max | Cr | Mo | Ni | V |
|---|---|---|---|---|---|---|---|---|---|
| 1045 | 0.43-0.50 | 0.15-0.35 | 0.60-0.90 | 0.040 | 0.050 | - | - | - | - |
| 1050 | 0.48-0.55 | 0.15-0.35 | 0.60-0.90 | 0.040 | 0.050 | - | - | - | - |
| 4140 | 0.38-0.43 | 0.15-0.35 | 0.75-1.00 | 0.035 | 0.040 | 0.80-1.10 | 0.15-0.25 | - | - |

## MECHANICAL PROPERTIES - IN Q+T CONDITION

| STEEL GRADE AISI/SAE | Rm Tensile strength - psi - | $Rp_{0.2}$ Yield point - psi - | $A_5$ Elongation - % min - |
|---|---|---|---|
| 1045 | min 100 000 | min 75 000 | 8 |
| 1050 | min 115 000 | min 100 000 | 8 |
| 4140 | min 115 000 | min 100 000 | 8 |

**1 000 psi = 1 ksi = 6,8947 N/mm²**
**1 N/mm² = 145, 04 psi**

## MANUFACTURING process

**Chamfering**
**Peeling**
**Straightening - Burnishing**
**Cricks control (Dr Foerster) & anti-mix**
**Rough grinding**
**Induction hardening**
- medium frequency
- high frequency

**Rough grinding**
**Grinding for finishing**
**Belt polishing**
**Hard chrome plating**
- horizontal bath
- continuous chrome plating

**Polishing**
**Control**
**Packing**
**Cutting**
**Customizing**
- mechanical machining according with drawing

## PRODUCTION programme

| | |
|---|---|
| **BAC** | hard chrome plated steel bars C45E |
| **BACM** | hard chrome plated steel bars 20MnV6 |
| **BATC** | induction hardened and hard chrome plated steel bars C45E |
| **BOC** | hard chrome plated steel bars 42CrMo4 |
| **BOTC** | induction hardened and hard chrome plated steel bars 42CrMo4 |
| **ACIF** | ground stainless steel bars X20Cr13 (W1.4021), X46Cr13 (W1.4034) |
| **BACX** | hard chrome plated stainless steel bars X20Cr13 (W1.4021), X46Cr13 (W1.4034) |
| **TUC** | hard chrome plated steel tubes E355 SR (ST52 BK+S) |
| **TUCS** | hard chrome plated steel tubes with special wall thickness ST52 |
| NEW **CS 500** | CROMSTEEL 500 hard chrome plated steel bars & tubes with high corrosion resistance (Rating 9/500h) |

## BAC series hard chrome plated steel bars

### C45E (Ck45)

**Diameter (range for metric sizes):**
6 - 140mm
**Diameter (range for imperial sizes):**
¼" - 5.5"
**Steel grade: C45E EN10083**
**(Ck 45 DIN17200; W1.1191) -** in natural state
**Tolerance:**
ISO f7 (h7 by request)
**Roundness:** (IT)/2
**Standard length:** 5500 - 6500 mm
**Special lengths:** by request

**Surfaces roughness:** Ra - max. 0,20 µm
(average of the measured values
0.05 - 0.15 µm)
**Chrome layer thickness:**
< Ø 20 = min. 15 µm
≥ Ø 20 = min. 20 µm
**Chrome layer hardness:** min. 900 HV 0,1
**Straightness:**
≤ Ø 16 ≤ 0.3mm/1000mm
> Ø 16 ≤ 0.2mm/1000mm

## BACM series hard chrome plated steel bars

### 20MnV6

**Diameter (range for metric sizes):**
6 - 140 mm
**Diameter (range for imperial sizes):**
¼" - 5.5"
**Steel grade: 20MnV6 -** in natural state
**Tolerance:** ISO f7 (h7 by request)
**Roundness:** (IT)/2
**Standard length:**
≤ Ø 10 = aprox. 4000mm
> Ø 10 = 5500 - 6500mm
**Special lengths:**
by request

**Surfaces roughness:** Ra - max. 0,20 µm
(average of the measured values
0.05-0.15 µm)
**Chrome layer thickness:**
< Ø 20 = min. 15 µm
≥ Ø 20 = min. 20 µm
**Chrome layer hardness:** min.900 HV 0,1
**Straightness:**
≤ Ø 16 ≤ 0.3mm/1000mm
> Ø 16 ≤ 0.2mm/1000mm

## C45E (Ck45)

**Diameter (range for metric size):**
6 - 140 mm
**Diameter (range for imperial sizes):**
¼" - 5.5"
**Steel grade: C45E EN10083 (Ck 45 DIN17200; WERKSTOFF 1.1191)**
- in natural state
**Tolerance:** ISO f7 (h7 by request)
**Roundness:** (IT)/2
**Standard length:** 5500 - 6500 mm
**Special lengths:** by request
**Surfaces roughness:**
Ra - max. 0,20 µm
(average of the measured values
0.05-0.15 µm)
**Hardening depth:**
0.4 - 3.4 mm
depending on diameter

| Hardening depth - mm - | Ø - mm - |
|---|---|
| 0.5 - 0.8 | 6 |
| 0.6 - 0.9 | 8 |
| 0.7 - 1.0 | 10 |
| 0.8 - 1.2 | 12 - 14 |
| 0.9 - 1.3 | 14 |
| 1.0 - 1.4 | 15 |
| 1.1 - 1.5 | 16 - 18 |
| 1.2 - 1.5 | 20 - 22 |
| 1.4 - 1.6 | 24 |
| 1.5 - 1.7 | 25 |
| 1.5 - 1.8 | 28 |
| 1.5 - 1.9 | 30 - 35 |
| 1.6 - 2.0 | 40 - 45 |
| 2.2 - 2.6 | 50 - 85 |
| 2.2 - 3.2 | 90 - 100 |
| 2.4 - 3.4 | 105 - 140 |
| Special hardening depth: by request | |

**Chrome layer thickness:**
< Ø 20 = min. 15 µm
≥ Ø 20 = min. 20 µm
**Chrome layer hardness:**
min.900 HV 0,1
**Surface hardness:**
Min. 55 HRC
**Straightness:**
≤ Ø 16 ≤ 0.3mm/1000mm
> Ø 16 ≤ 0.2mm/1000mm

## BOC series hard chrome plated steel bars

**42CrMo4**

**Diameter (range for metric sizes):**
16 - 140 mm - in quenched + tempered condition
**Diameter (range for imperial sizes):**
¾" - 5.5" - in quenched + tempered condition
**Steel grade: 42CrMo4 EN10083 (W1.7225)**
- in quenched + tempered condition
**Tolerance:** ISO f7 (h7 by request)
**Roundness:** (IT)/2
**Standard length:** 5500 - 6500 mm
**Special lengths:** by request
**Surfaces roughness:** Ra - max. 0,20 µm
(average of the measured values 0.05-0.15 µm)
**Chrome layer thickness:**
< Ø 20 = min. 15 µm
≥ Ø 20 = min. 20 µm
**Chrome layer hardness:**
min. 900 HV 0,1
**Straightness:**
≤ Ø 16 ≤ 0.3mm/1000mm
> Ø 16 ≤ 0.2mm/1000mm

## BOTC series induction hardened and hard chrome plated steel bars

**42CrMo4**

**Diameter (range for metric sizes):**
16 - 140 mm - in quenched + tempered condition
**Diameter (range for imperial sizes):**
¾" - 5.5" - in quenched + tempered condition
**Steel grade: 42CrMo4 EN 10083 (W1.7225)**
- in quenched + tempered condition
**Tolerance:**
ISO f7 (h7 by request)
**Roundness:**
(IT)/2
**Standard length:**
5500 - 6500 mm
**Special lengths:** by request
**Surfaces roughness:**
Ra - max. 0,20 µm
(average of the measured values 0.05-0.15 µm)
**Hardening depth:**
1.2 - 3.4 mm
depending on diameter

| Hardening depth - mm - | Ø - mm - |
|---|---|
| 1.1 - 1.5 | 16 - 18 |
| 1.2 - 1.5 | 20 - 22 |
| 1.4 - 1.6 | 24 |
| 1.5 - 1.7 | 25 |
| 1.5 - 1.8 | 28 |
| 1.5 - 1.9 | 30 - 38 |
| 1.6 - 2.0 | 40 - 45 |
| 2.2 - 2.6 | 50 - 85 |
| 2.2 - 3.2 | 90 - 100 |
| 2.4 - 3.4 | 105 - 140 |
| Special hardening depth: by request | |

**Chrome layer thickness:**
< Ø 20 = min. 15 µm
≥ Ø 20 = min. 20 µm
**Chrome layer hardness:**
min.900 HV 0,1
**Surface hardness:** min. 55 HRC
**Straightness:**
≤ Ø 16 ≤ 0.3mm/1000mm
> Ø 16 ≤ 0.2mm/1000mm

## TUC series hard chrome plated steel tubes

**EN 10305 - 1(DIN 2391) - E 355 SR (St 52 BK+S)**

**Roundness:** (IT)/2
**Standard length:** 5000 - 7000 mm
**Special lengths:** by request
**Surfaces roughness:** Ra - max. 0,20 µm
(average of the measured values 0.05-0.15 µm)
**Chrome layer thickness:** min. 20 µm
**Chrome layer hardness:** min. 900 HV 0,1
**Straightness:** 0.2 mm / 1000 mm

| Mechanical properties E355 SR (St 52 BK+S) | $Rp_{0.2}$ N/mm² | Rm N/mm² | $A_5$% |
|---|---|---|---|
| | min. 450 | min. 590 | min. 12 |

| Dimensions range | | | | |
|---|---|---|---|---|
| OD - mm - | Tol. | ID - mm - | | |
| 10 | f7 | 4 | - | - |
| 16 | f7 | 10 | - | - |
| 20 | f7 | 14 | 15 | - |
| 21 | f7 | 15 | - | - |
| 22 | f7 | 16 | - | - |
| 25 | f7 | 15 | 19 | 20 |
| 30 | f7 | 15 | 20 | - |
| 32 | f7 | 20 | 24 | - |
| 35 | f7 | 20 | 25 | - |
| 40 | f7 | 20 | 25 | 30 |
| 45 | f7 | 25 | 30 | 35 |
| 50 | f7 | 30 | 35 | 40 |
| 55 | f7 | 35 | 40 | 45 |
| 60 | f7 | 40 | 45 | 50 |
| 63 | f7 | 43 | 48 | 53 |
| 65 | f7 | 45 | 50 | 55 |
| 70 | f7 | 50 | 55 | 60 |
| 80 | f7 | 60 | 65 | 70 |
| 85 | f7 | 65 | 70 | 75 |
| 90 | f7 | 70 | 75 | 80 |
| 100 | f7 | 80 | 85 | 90 |
| 120 | f7 | 100 | - | - |

## TUCS series hard chrome plated steel tubes with special wall thickness

**St 52**

**Length:** max. 7000 mm
**Chrome layer thickness:** min. 20 µm
**Chrome layer hardness:** min. 900 HV 0,1

| Dimensions range | | |
|---|---|---|
| OD - mm - | Tol. | ID - mm - |
| 50 | f7 | 25 |
| 55 | f7 | 30 |
| 60 | f7 | 30 |
| 65 | f7 | 30 |
| 70 | f7 | 40 |
| 75 | f7 | 35 |
| 80 | f7 | 40 |
| 85 | f7 | 45 |
| 90 | f7 | 50 |
| 95 | f7 | 50 |
| 100 | f7 | 60 |

NEW! SPECIAL PRODUCT

# CROMSTEEL 500

It is surely known that a chrome plated product needs the highest corrosion resistance.

The more and more particular demands of the market, as well as the continuous desire of improving its quality, motivated CROMSTEEL to develop a new technology able to add more corrosion resistance to the chrome plated products.

With a special treatment applied after the chromium plating process and with a separate production cycle for this selected material, the bars and tubes made under the mark CROMSTEEL 500 give the guarantee of **Rating 9 / 500h corrosion resistance in salt spray test ISO 10289 1999 / ISO 9227 - NSS** and qualify them as one of the most appreciated products in the field.

It is notable the fact that CROMSTEEL 500 technology can be applied either for chromed bars and chromed tubes in different steel grades as Ck45, 20MnV6, 42CroMo4, St52 keeping the standard technical characteristics of each product, with only one exception: for CROMSTEEL 500 the layer of chrome is guaranteed as 30±5 microns.

We strongly recommend this product for harsh environments.

**Rating 9 / 500h corrosion resistance in salt spray test ISO 10289 - 1999 / ISO 9227 - NSS**

## ACIF series ground stainless steel bars

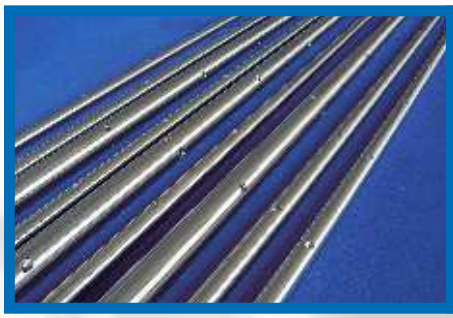
**X20Cr13 (W1.4021); X46Cr13 (W1.4034)**

**Diameter (range for metric sizes):**
8 - 60 mm
**Diameter (range for imperial sizes ):**
½" - 2"
**Steel grade:**
**X20Cr13 (W 1.4021); X46Cr13 (W 1.4034)**
**Tolerance:**
ISO h7 (others by request)
**Roundness:** (IT)/2
**Standard length:**
5500 - 6500 mm
**Surfaces roughness:** Ra - max. 0,20 µm
**Straightness:**
≤ Ø 16 = 0.3mm/1000mm
> Ø 16 = 0.2mm/1000mm

## BACX series hard chrome plated stainless steel bars

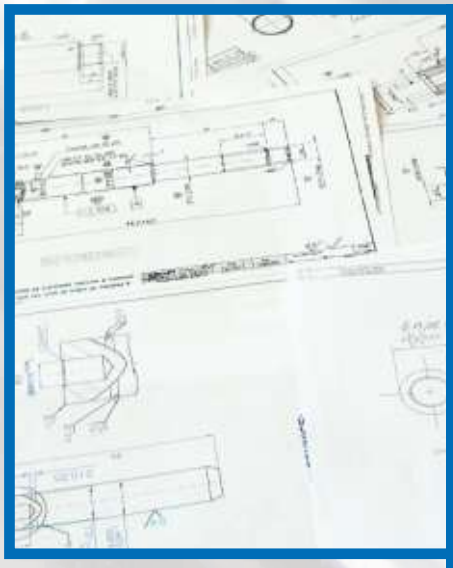
**X20Cr13 (W1.4021); X46Cr13 (W1.4034)**

**Diameter ( range for metric sizes):**
8 - 80 mm
**Diameter ( range for imperial sizes):**
½"- 3"
**Steel grade:**
**X20Cr13 (W 1.4021);**
**X46Cr13 (W 1.4034)**
**Tolerance:** ISO f7
**Roundness:** (IT)/2
**Standard length:** 5500 - 6500 mm
**Surfaces roughness:**
Ra - max. 0,20 µm
(average of the measured values
0.05-0.15 µm)
**Chrome layer thickness:**
< Ø 20 = min. 15 µm
≥ Ø 20 = min. 20 µm
**Chrome layer hardness:**
min. 900 HV 0,1
**Straightness:**
≤ Ø 16 = 0.3mm/1000mm
> Ø 16 = 0.2mm/1000mm



# Product RANGE

piston rods
shafts
shock absorbers shafts
cylinders covers
plunjers



CONCEPT

PRODUCTION

FINAL PRODUCT

# CYLINDER TUBES

## Skived and roller burnished / inside honed tubes H8

According to EN 10305-1 (DIN2391) seamless tubes BK+S H8

## SSID tubes ready to use H9

According to EN 10305-2 (DIN 2393) welded tubes BK H9

**TUL** skived and roller burnished / inside honed tubes H8 - E355 SR (St 52 BK + S)

**TTS** "ready to use" SSID (special smooth inside diameter) cylinder tubes H9/H10-E 355 (St52)

# TUL series

skived and roller burnished tubes / inside honed tubes

## H8 - EN 10305 - 1 (DIN 2391) - E355 SR (St 52 BK+S)

**Standard length:** 5000 - 8000 mm
**Special lengths:** by request
**Straightness:**
**Local deviation:**
max. 1 mm per each meter of length
**Total deviation:**
for tubes with length less than 6 m - max. 3.5 mm;
for tubes with length bigger than 6 m, the tolerance shall be increased by 0.5 mm for each 1 m over 6 m.

| | | |
|---|---|---|
| Surface finish | O.D. | Smooth as drawn |
| | I.D. | for skived and roller burnished tubes Ra ≤ 0.22 |
| | | for honed tubes Ra ≤ 0.40 |

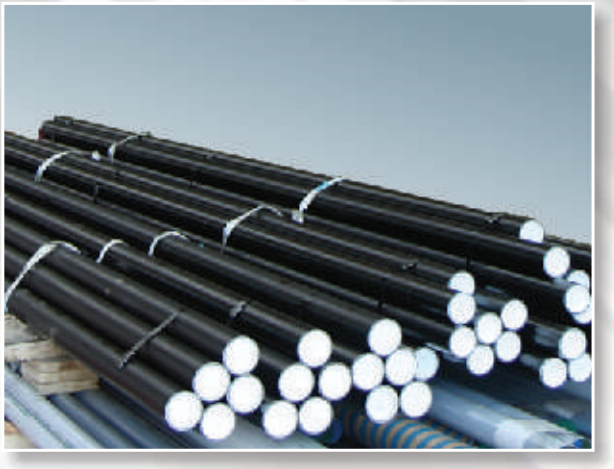
| Chemical composition | C % | Mn % | Si % | P % | S % |
|---|---|---|---|---|---|
| | max. 0.22 | max. 1.60 | max. 0.55 | max. 0.025 | max. 0.025 |

| Mechanical properties E355 SR (St 52 BK+S) | $Rp_{0.2}$ N/mm² | Rm N/mm² | $A_5$% |
|---|---|---|---|
| | min. 450 | min. 590 | min. 12 |

**Eccentricity:**
OD ≤ 125 mm - 5%
OD > 125 mm - 7.5%

**Advantages of the skived and roller burnished surfaces:**
Low roughness
High load bearing ratio
No protruding peaks but plateaus and valleys
Increased hardness
Less galling

**These properties are ideally suited for sliding surfaces meal to metal or to non metallic material.**



| ID - mm - | OD - mm - | OD - mm - | OD - mm - | OD - mm - | OD - mm - | OD - mm - |
|---|---|---|---|---|---|---|
| 40 | 50 | 52 | 55 | | | |
| 45 | 55 | | | | | |
| 50 | 60 | 62 | 65 | 70 | | |
| 50.8 | 60.32 | 63.5 | | | | |
| 55 | 65 | 70 | | | | |
| 57.15 | 69.85 | | | | | |
| 60 | 70 | 72 | 75 | 80 | | |
| 63 | 73 | 75 | 78 | 80 | 83 | |
| 63.5 | 76.2 | | | | | |
| 65 | 75 | 80 | 85 | | | |
| 69.85 | 82.55 | | | | | |
| 70 | 80 | 82 | 85 | 90 | | |
| 75 | 85 | 90 | 95 | | | |
| 76.2 | 88.9 | | | | | |
| 80 | 90 | 92 | 95 | 100 | 105 | 110 |
| 85 | 95 | 100 | | | | |
| 88.9 | 101.6 | 107.95 | | | | |
| 90 | 102 | 105 | 110 | | | |
| 95 | 110 | | | | | |
| 95.25 | 107.95 | | | | | |
| 100 | 112 | 115 | 120 | 125 | 130 | |
| 101.6 | 114.3 | 120.65 | | | | |
| 105 | 120 | 125 | | | | |
| 110 | 125 | 130 | 140 | | | |
| 114.3 | 130 | 133.35 | 139.7 | | | |
| 115 | 130 | 135 | | | | |
| 120 | 135 | 140 | 145 | 150 | | |
| 120.65 | 139.7 | | | | | |
| 125 | 140 | 145 | 150 | 160 | | |
| 127 | 146.05 | | | | | |
| 130 | 145 | 150 | 155 | 160 | | |
| 135 | 160 | | | | | |
| 139.7 | 158.75 | 165.1 | | | | |
| 140 | 155 | 160 | 165 | 170 | | |
| 145 | 177.8 | | | | | |
| 150 | 170 | 180 | | | | |
| 152.4 | 165.1 | 171.45 | 177.8 | | | |
| 160 | 180 | 185 | 190 | 195 | 200 | |
| 165 | 185 | 190 | 195 | | | |
| 165.1 | 184.15 | | | | | |
| 170 | 190 | 200 | | | | |
| 177.8 | 203.2 | | | | | |
| 180 | 200 | 205 | 210 | | | |
| 200 | 210(H11) | 220 | 225 | 230 | 240 | 245 |
| 210 | 235 | 240 | 245 | 267 | | |
| 215 | 245 | 255 | 267 | | | |
| 220 | 250 | 271 | | | | |
| 225 | 273 | | | | | |
| 230 | 251 | 254 | 260 | | | |
| 250 | 280 | 300 | | | | |
| 260 | 295 | | | | | |
| 280 | 315 | | | | | |
| 300 | 350 | | | | | |

# TTS series cold drawn welded tubes - ready to use

## SSID (smooth surface inside diameter)

| | |
|---|---|
| **Tubes for hydraulic cylinders** | **Steel grade** ST52 (E 355)<br>DIN 2393 (EN 10305-2) |
| **Tubes are supplied only in BK condition** | Chemical analysis<br>**C%** 0.17-0.22; **Mn%** 1.20-1.60; **Si%** 0.40 max; **P%** 0.025 max; **S%** 0.025 max<br>Mechanical properties<br>**Rp 0.2 MPa** 540 min; **Rm MPa** 630 min; **$A_5$%** 7 min; **HRB** 90 min |
| **Surface Finish** | OD Smooth as drawn (DIN 2393)<br>ID Roughness Ra<0.80 µm (average 0.40 - 0.50 µm) according to the ISO/ DIS/ 4394 Quality Systems |
| **Outside diameter** | DIN 2393 |
| **Ovality** | Included into the ID & OD Tolerance |
| **Eccentricity** | The eccentricity does not exceed 3% of the mean wall thickness |
| **Straightness** | 1.00 mm/m 0.80 mm/m max. by request |

| Pos. | ID mm | ID Tol.ISO | OD mm | WT mm | Weight Kg/m |
|---|---|---|---|---|---|
| 1 | 30.00 | ISO-H9 | 40.00 | 5.00 | 4.32 |
| 2 | 31.75 | ISO-H10 | 38.10 | 3.18 | 2.73 |
| 3 | 35.00 | ISO-H9 | 45.00 | 5.00 | 4.93 |
| 4 | 38.10 | ISO-H10 | 44.45 | 3.18 | 3.23 |
| 5 | 38.10 | ISO-H10 | 47.63 | 4.77 | 5.04 |
| 6 | 38.10 | ISO-H9 | 50.80 | 6.35 | 6.96 |
| 7 | 40.00 | ISO-H9 | 50.00 | 5.00 | 5.55 |
| 8 | 40.00 | ISO-H9 | 55.00 | 7.50 | 2.46 |
| 9 | 45.40 | ISO-H10 | 55.00 | 5.00 | 2.24 |
| 10 | 45.00 | ISO-H9 | 60.00 | 7.50 | 2.00 |
| 11 | 50.00 | ISO-H9 | 60.00 | 5.00 | 1.68 |
| 12 | 50.00 | ISO-H9 | 65.00 | 7.50 | 3.55 |
| 13 | 55.00 | ISO-H9 | 65.00 | 5.00 | 7.86 |
| 14 | 55.00 | ISO-H9 | 70.00 | 7.50 | 3.23 |
| 15 | 57.15 | ISO-H9 | 69.85 | 6.35 | 5.04 |
| 16 | 60.00 | ISO-H9 | 70.00 | 5.00 | 2.07 |
| 17 | 60.00 | ISO-H9 | 75.00 | 7.50 | 5.55 |
| 18 | 63.00 | ISO-H9 | 75.00 | 5.00 | 10.21 |
| 19 | 65.00 | ISO-H9 | 75.00 | 5.00 | 8.63 |
| 20 | 65.00 | ISO-H9 | 80.00 | 7.50 | 13.41 |
| 21 | 69.85 | ISO-H9 | 82.55 | 6.35 | 11.93 |
| 22 | 70.00 | ISO-H9 | 80.00 | 5.00 | 9.25 |
| 23 | 70.00 | ISO-H9 | 85.00 | 7.50 | 14.33 |
| 24 | 75.00 | ISO-H9 | 85.00 | 5.00 | 9.86 |
| 25 | 75.00 | ISO-H9 | 90.00 | 7.50 | 15.26 |
| 26 | 80.00 | ISO-H9 | 90.00 | 5.00 | 10.48 |
| 27 | 80.00 | ISO-H9 | 92.00 | 6.00 | 12.72 |
| 28 | 80.00 | ISO-H9 | 95.00 | 7.50 | 16.18 |
| 29 | 85.00 | ISO-H9 | 95.00 | 5.00 | 11.10 |
| 30 | 85.00 | ISO-H9 | 100.00 | 7.50 | 17.11 |
| 31 | 90.00 | ISO-H9 | 100.00 | 5.00 | 11.71 |
| 32 | 90.00 | ISO-H9 | 105.00 | 7.50 | 18.03 |
| 33 | 95.00 | ISO-H9 | 105.00 | 5.00 | 12.33 |
| 34 | 95.00 | ISO-H9 | 110.00 | 7.50 | 18.96 |
| 35 | 100.00 | ISO-H9 | 115.00 | 7.50 | 19.88 |

**Other dimensions:** by request

# TUCL series

telescopic tube (outside chrome plated - inside skived and roller burnished steel tubes)

**EN 10305 1 (DIN 2391) - E355 SR (St 52 BK+S) or**
**EN 10305 - 2 (DIN 2393) - E355 SR (St 52 BK+S)**

| TUCL usual dimensions | | | |
|---|---|---|---|
| OD - mm - | OD Tol. | ID Tol. | ID - mm - |
| 60 | f7 | H8 | 50 |
| 70 | f7 | H8 | 60 |
| 75 | f7 | H8 | 63 |
| 75 | f7 | H8 | 65 |
| 80 | f7 | H8 | 60 |
| 80 | f7 | H8 | 70 |
| 90 | f7 | H8 | 80 |
| 95 | f7 | H8 | 75 |
| 95 | f7 | H8 | 80 |
| 95 | f7 | H8 | 85 |
| 100 | f7 | H8 | 90 |
| 105 | f7 | H8 | 90 |
| 115 | f7 | H8 | 100 |
| 120 | f7 | H8 | 100 |
| 125 | f7 | H8 | 100 |

**Other dimensions:** by request (min. 40mm inside; max.140mm outside)
**Length:** max. 7000 mm
**Chrome layer thickness:** min. 20 µm
**Chrome layer hardness:** min. 900 HV 0,1
**Surfaces roughness:**
- for OD: according TUC products
- for ID: according TUL products

**Tolerance of OD:** f7
**Tolerance of ID:** H8

| Mechanical properties E355 SR (St 52 BK+S) | $Rp_{0.2}$ N/mm² | Rm N/mm² | $A_5$% |
|---|---|---|---|
| DIN 2391 | min. 450 | min. 590 | min. 12 |
| DIN 2393 | min. 450 | min. 520 | min. 15 |

# QUALITY control

Chemical composition  with spectrometer

Metalographical structure with microscope

Criks and defects - Dr.Foerster equipments

Antimixture - Dr.Foerster magnatest antimix

Dimensions-lasers sistem and digitals micrometers

Straightness-special instruments and machine

Hardness HRC

Micro-hardness HV

Roughness Ra; Rt; Rmax; Rz; ...

Circularity and cilindricity

Chrome thickness layer

Corrosion resistance in salt spray test
ISO 10289 – 1999/ISO 9227-NSS

- Rating 9 / 120h for Cromsteel standard products

- Rating 9 / 500h for Cromsteel 500 products

# Our products packaging
## is recyclable

# Unpacking our products
## is very easy

Packing options:
- strong oiled
- plastic sleeve extrusion
- cardboard tubes
- plastic rings
- aluminium vacuum bags
- wooden cases
- wooden pallets or special pallets


**Some cautions related to storage and handling:**

- keep stored in a dry place
- do not expose the chromed bars/tubes to the sun light
- direct contact with the floor has to be avoided; it's preferable to use supports rubber or wood lined supports
- whenever possible, use the bridge crane to load or unload the bars; when you use fork lift be sure that this one is lined with wood, plastic or rubber
- during handling, always lift the bundles by using canvas or plastic belts
- be aware of the risk of corrosion; salty or polluted atmosphere are corrosive

# DELIVERY

## Documents

Invoice
Certicate EUR1
Inspection Certificate EN 10204 3.1.B
Packing list
Origin certificate (by request)
First sample test report (by request)
Process capability report Cpk (by request)


## Transportation

by air (customized products)
by truck (lorry)
by sea with containers - 20' or 40' DV or OT

AEROQ

Certification Body for Occupational Health and Safety Management Systems

Associated Member of the European Organization for Quality - EOQ

CERTIFICATE

nr.: 277 S

This is to certify the Occupational Health and Safety Management Systems

of

CROMSTEEL INDUSTRIES S.A.

România, Târgoviște, Str. Laminorului, nr. 16, Jud. Dâmbovița

Complies with:

SR OHSAS 18001:2008 / BS OHSAS 18001:2007

Domain:

References: Audit Report

Issue Date: 07.05.2009

President of Governing Board

Eng. Constantin CHETE

F-109-03

OHSAS 18001

SR OHSAS 18001:2008 / BS OHSAS 18001:2007
for the System of Health and Work Security

AEROQ

Accredited Certification Body for Environmental Management Systems – SR EN ISO/CEI 17021

Associated Member of the European Organization for Quality - EOQ

CERTIFICATE

nr: 495 M

This is to certify the: Environmental Management System

of

CROMSTEEL INDUSTRIES S.A.

România, Târgoviște, Strada Laminorului, nr. 16, Județul Dâmbovița

Complies with:

SR EN ISO 14001:2005, EN ISO 14001:2004

Domain:

– Steel bars manufacturing by mechanical working, precision shafts and arbors (chrome plated and/or induction case-hardened); hard chromism plating and grinding.

– Steel tubes manufacturing by mechanical working for hydraulic applications.

References: RENAR Accreditation Certificate nr.
Audit Report nr. 1202/27.04.2009

Issue Date: 07.05.2009

Expire Date: 06.05.2012

President of Governing Board

Eng. Constantin CHETE

F-106-2000 / Ed. 2

AEROQ S.A. Strada

ISO 14001

SR EN ISO 14001:2005, EN ISO 14001:2004
for the System of Medium Management

AEROQ

Body for Quality Management Systems Certification – SR EN ISO/CEI 17021

Associated Member of the European Organization for Quality - EOQ

CERTIFICATE

nr.: 598

This is to certify the Quality Management System

of

CROMSTEEL INDUSTRIES S.A.

România, Târgoviște, Strada Laminorului, nr. 16, Județul Dâmbovița

Complies with:

SR EN ISO 9001:2008, EN ISO 9001:2008

Domain:

– Steel bars manufacturing by mechanical working, precision shafts and arbors (chrome plated and/or induction case-hardened); hard chromium plating and grinding.

– Steel tubes manufacturing by mechanical working for hydraulic applications.

References: Audit Report nr. 1202/27.04.2009

Recertification Date: 07.05.2009

Expire Date: 06.05.2012

Initial Certification Date: 27.06.2003

President of Governing Board,

Eng. Constantin CHETE

Director,

Constantin AVRAM

F-1030-06 / Ed.7

AEROQ S.A. – 14 B, Felecu Street, Sector 1, Bucharest, Romania

ISO 9001

SR EN ISO 9001:2008, EN ISO 9001:2008
for Quality Management Systems

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